L Number	Hits	Search Text	DB	Time stamp
1	3217	((138/97) or (138/98) or (15/104.05) or (15/104.09) or (15/104.31) or (701/28) or (901/44) or (901/46) or (901/47)).CCLS.	USPAT; US-PGPUB	2003/08/20 15:28
2	567807	releasable or releasably or released	USPAT; US-PGPUB	2003/08/20 15:28
3	1687156	remove or removable or removed	USPAT; US-PGPUB	2003/08/20 15:29
4	54815	interchangeable	USPAT; US-PGPUB	2003/08/20 15:29
5	59	(((138/97) or (138/98) or (15/104.05) or (15/104.09) or (15/104.31) or (701/28) or (901/44) or (901/46) or (901/47)).CCLS.) and interchangeable	USPAT; US-PGPUB	2003/08/20 15:29
6	1687534	2or (remove or removable or removed)	USPAT; US-PGPUB	2003/08/20 15:29
7	1892565	(releasable or releasably or released) or (remove or removable or removed)	USPAT; US-PGPUB	2003/08/20 15:29
8	1359	(((138/97) or (138/98) or (15/104.05) or (15/104.09) or (15/104.31) or (701/28) or (901/44) or (901/46) or (901/47)).CCLS.) and ((releasable or releasably or released) or (remove or removable or removed))	USPAT; US-PGPUB	2003/08/20 15:30
9	37	((((138/97) or (138/98) or (15/104.05) or (15/104.09) or (15/104.31) or (701/28) or (901/44) or (901/46) or (901/47)).CCLS.) and interchangeable) and ((((138/97) or (138/98) or (15/104.05) or (15/104.09) or (15/104.31) or (701/28) or (901/44) or (901/46) or (901/47)).CCLS.) and ((releasable or releasably or released) or (remove or removable or removed)))	USPAT; US-PGPUB	2003/08/20 15:33

US-PAT-NO: 6031371

DOCUMENT-IDENTIFIER: US 6031371 A

TITLE: Self-powered pipeline vehicle for carrying out an operation on a pipeline and method

DATE-ISSUED: February 29, 2000

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Smart; Andrew	Loughborough	N/A	N/A	GB

ASSIGNEE INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
BG plc	Berkshire	N/A	N/A	GB	03

APPL-NO: 08/ 952115

DATE FILED: March 23, 1998

FOREIGN-APPL-PRIORITY-DATA:

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PCT-DATA:
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US-CL-ISSUED: 324/220, 138/97 , 166/55 , 166/55.7 , 324/226

US-CL-CURRENT: 324/220, 138/97 , 166/55 , 166/55.7 , 324/226

FIELD-OF-SEARCH: 324/219-221; 324/226 ; 324/262 ; 73/40.5 ; 73/623 ; 15/104.05
; 15/104.063 ; 15/104.09 ; 165/11.2 ; 166/55 ; 166/55.7
; 166/55.8 ; 138/97

REF-CITED:

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PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
3238448	March 1966	Wood et al.	324/220
N/A	N/A	N/A	

3949292	April 1976	Beaver et al.			
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4852391	August 1989	Ruch et al.			
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4986314	January 1991	Himmler			
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FOREIGN PATENT DOCUMENTS

FOREIGN-PAT-NO	PUBN-DATE	COUNTRY	US-CL
4024926	February 1992	DE	

ART-UNIT: 282

PRIMARY-EXAMINER: Strecker; Gerard

ATTY-AGENT-FIRM: Oblon, Spivak, McClelland, Maier & Neustadt, P.C.

ABSTRACT:

An in-pipe vehicle for carrying out at least one operation in a pipeline.
The vehicle includes a train of modules interlinked by suspension units to
allow serpentine movement through pipe bends. The vehicle train has its own
internal power supply and drive mechanism in the modules. A detector module
determines the presence of a service junction using magnetic field information.
A manipulative module allows the vehicle to be temporarily wedged in the
pipeline while providing rotational movement to facilitate the desired
operation at the junction. This may include drilling and welding of a service
pipe to the main using appropriate modules. A remote probe typically
containing a magnetic field generator can be used to assist in service junction
location by the vehicle.

30 Claims, 8 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 8

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Detailed Description Text - DETX (3):
A number of existing service pipe take-offs 4 each provide the source of gas
to individual dwellings or other premises. As part of the refurbishment
programme, there is a need to insert a liner in each service pipe and to join
this to the main liner 2. In order to achieve this it has been necessary in
the past to make an excavation at each service connection 5 (e.g. a screwed
pipe connector or a service tee) and penetrate the main liner 2 through the
excavation, sealing the take off to the main using a saddle connection, having
removed part of the cast iron main in that region.

Detailed Description Text - DETX (4):
In the present invention, the need to have individual excavations is avoided
as is the need to remove portions of the cast iron main at such excavations.
FIG. 2 shows the mechanism now employed.

Detailed Description Text - DETX (19):

The manipulator module 13 again activates its extenders and clamps itself to the main pipe. A rotation of the module is effected if it is determined that this is necessary to locate the detector 70 in front of the tee. The hole already drilled in the main liner allows the service pipe liner to be inserted through the service pipe using a very flexible guide wire. The service liner has at its front end a tapered lead component formed from cross-linked polyethylene. The presence of the guide wire confirms to the detector that the correct service tee is being refurbished. Once the lead end is located in the drilled hole, the guide wire is removed, indicating that the jointing step can be effected. Thus the manipulator 13 rotates through 180.degree. to locate the heater device 71 on the fusion module 16 adjacent to the region of the service liner end, within the main liner hole and electric power is applied to the heater to fuse the joint in the liners by raising the temperature to the crystalline melt stage, causing the service liner end-piece to expand and fuse simultaneously to the main liner.

Detailed Description Text - DETX (25):
Each sledge 104 is retained by pins 120, 122 fixed in the body 114 and
projecting into slideways 124, 126 in the sledge 104. Each slideway 124, 126
terminates in an axially extending clearance hole 128, 130. Each sledge 104
can be removed from the body 114 by holding it in its radially innermost
position, as shown in the upper half of FIG. 2 and knocking the pins 120, 122
inwardly into the clearance holes 128, 130.

Detailed Description Text - DETX (37):
The probe in the service pipe can be removed and replaced with the guide
wire which carries the service pipe liner, before fusing this liner to the main
pipe liner.

Current US Cross Reference Classification - CCXR (1):
138/97